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(54) Fasteners

(57) An espagnolette fastener 2 for doors and windows comprises a rail plate 15 having a plurality of spaced apart bolts 13 for engagement with a corresponding plurality of keepers. The rail plate 15 is slidably mounted within the hollow section of a frame element 7a of the opening member, for example the door or glazed sash, and the bolts 13 project outwards through elongate openings 20 in the frame element 7a. The openings 20 extend parallel to the length of the frame element 7a and an externally mounted handle 24 is operable to slide the rail plate 15 lengthwise of the frame element 7a thereby displacing the bolts 13, guided by the opening 20, longitudinally to engage or disengage the keepers. In another embodiment (Fig. 8, not shown) the openings include a portion which is inclined to the length of the frame element whereby the bolts are simultaneously displaced longitudinally and laterally to provide a pull-in action or break-seal action.



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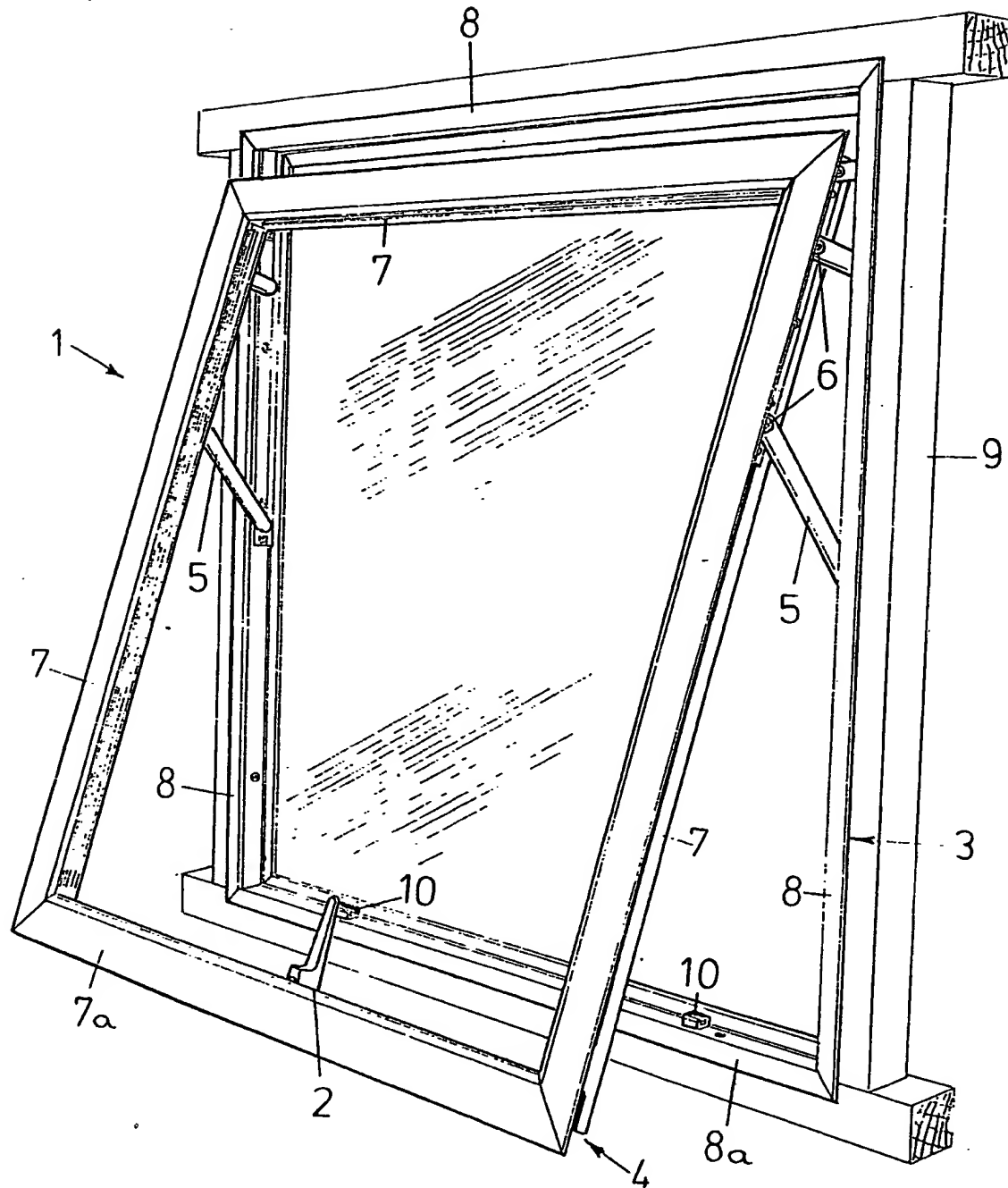


FIG. 1.

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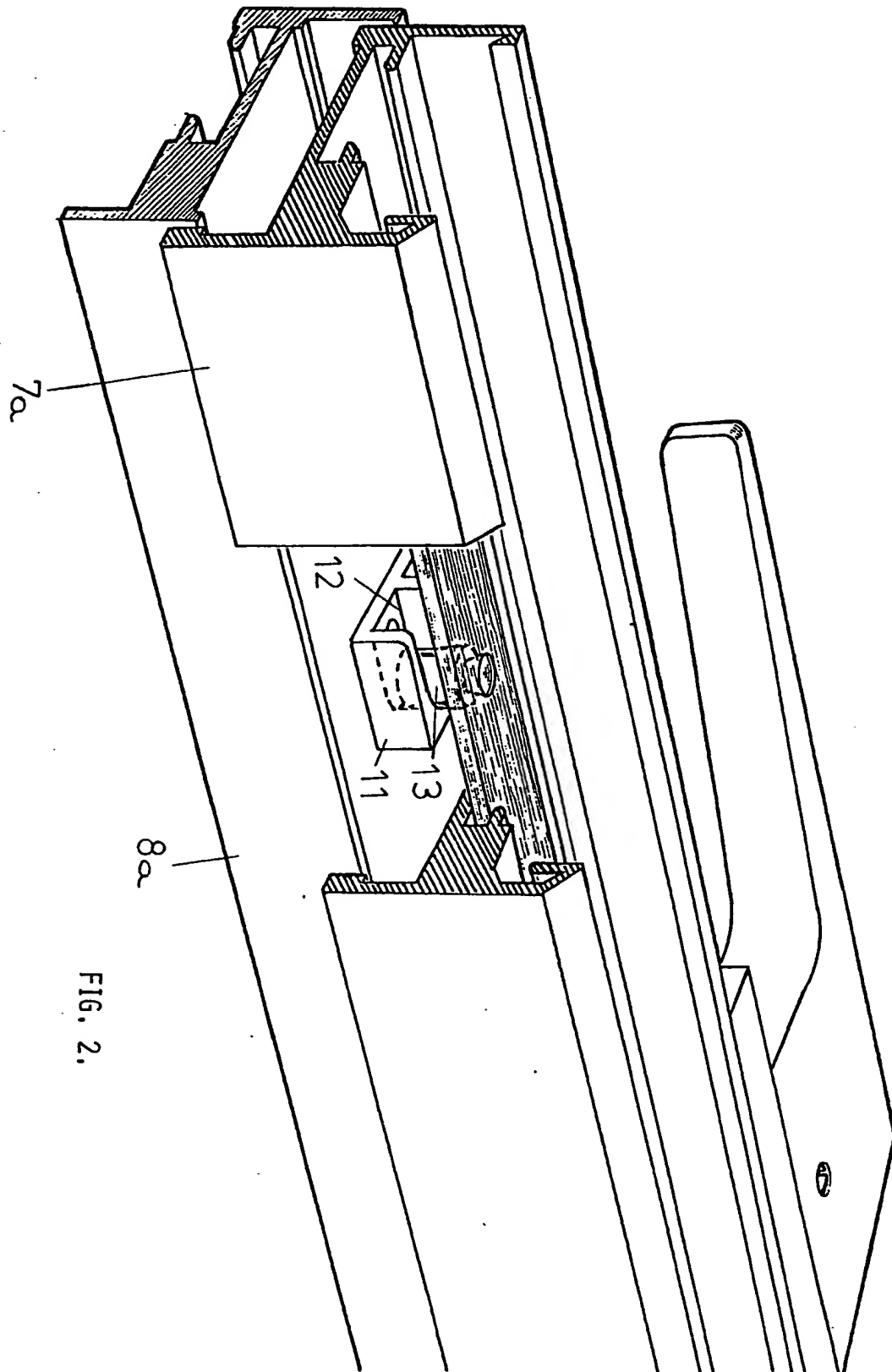
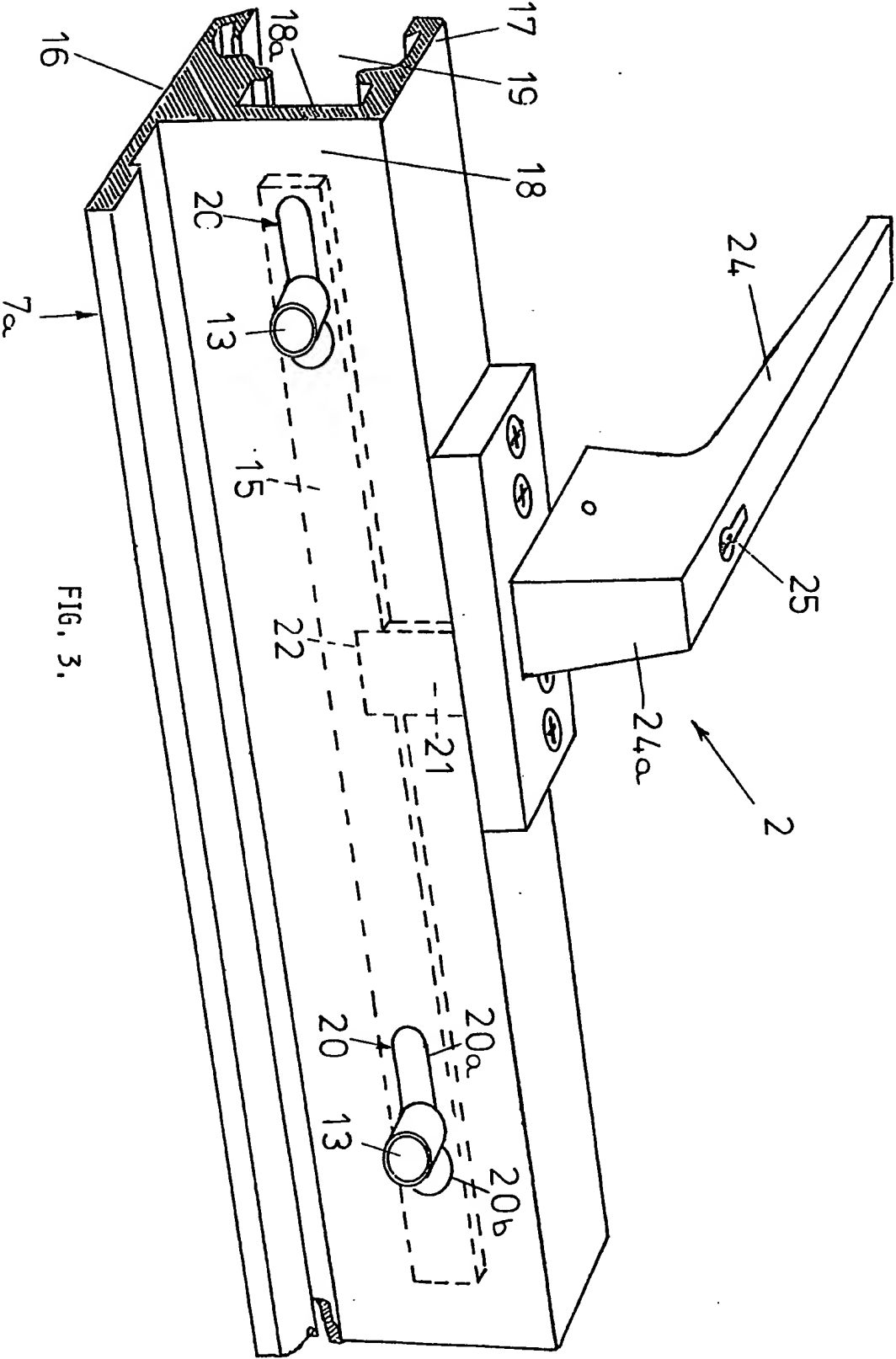
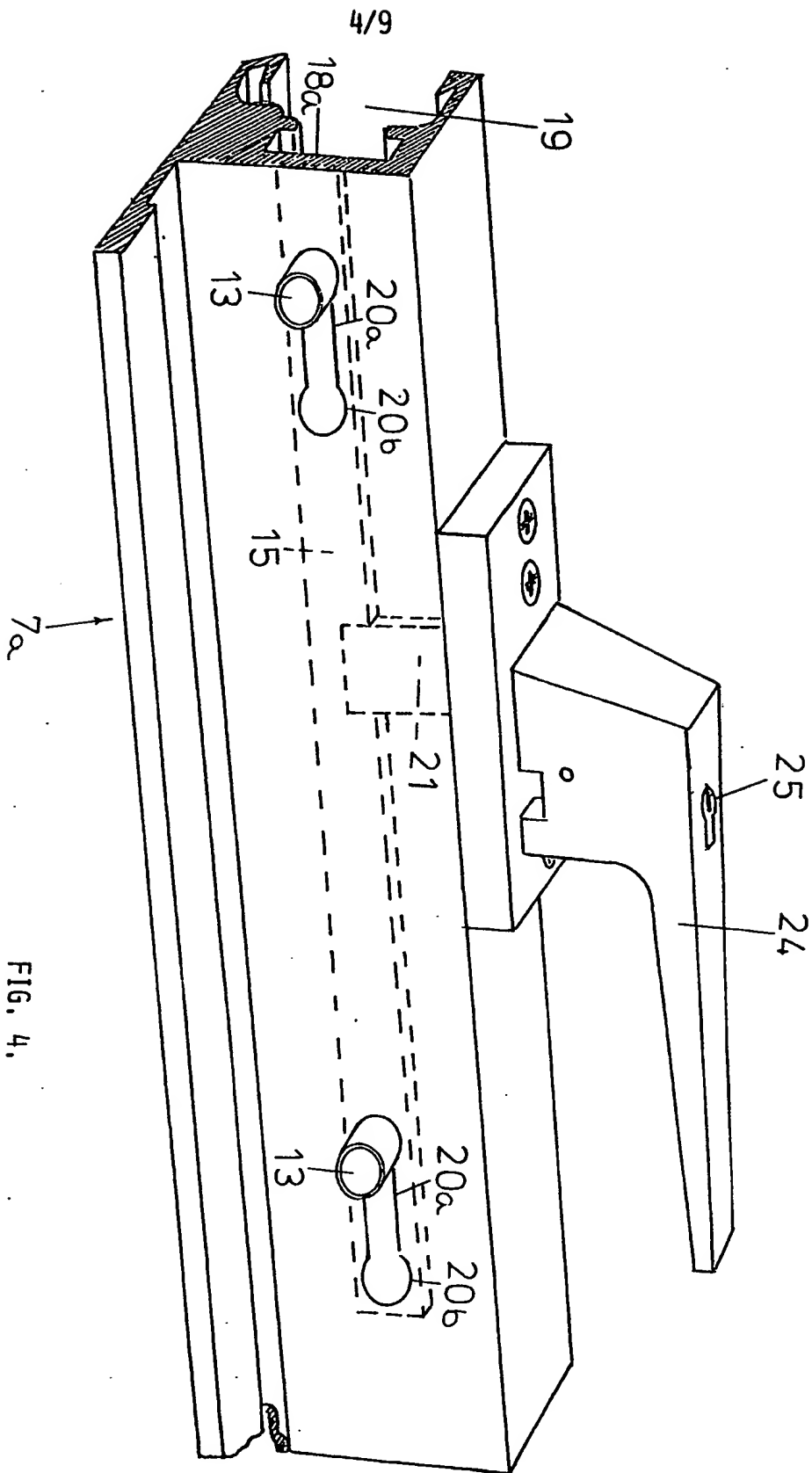


FIG. 2.

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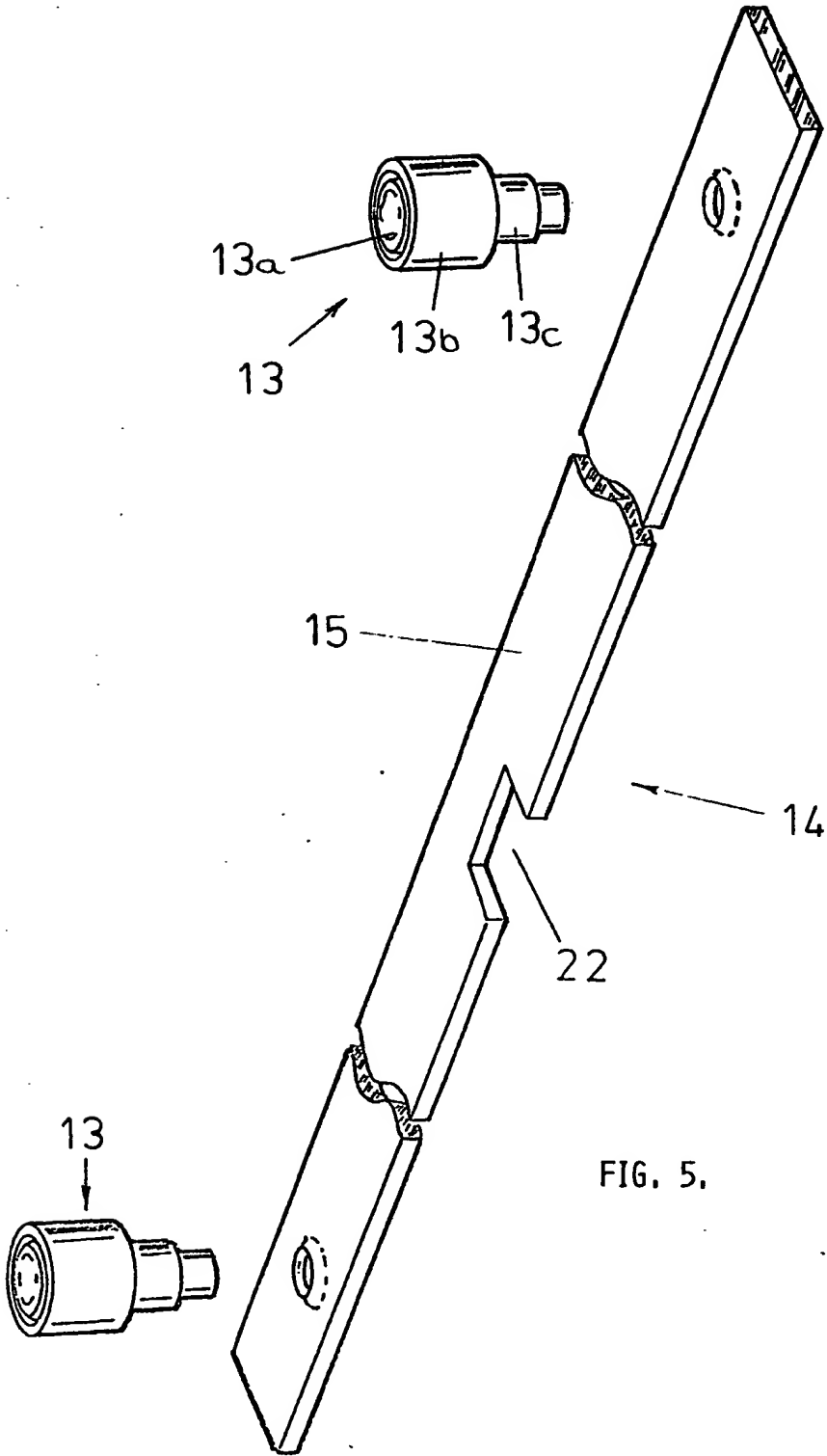


FIG. 5.

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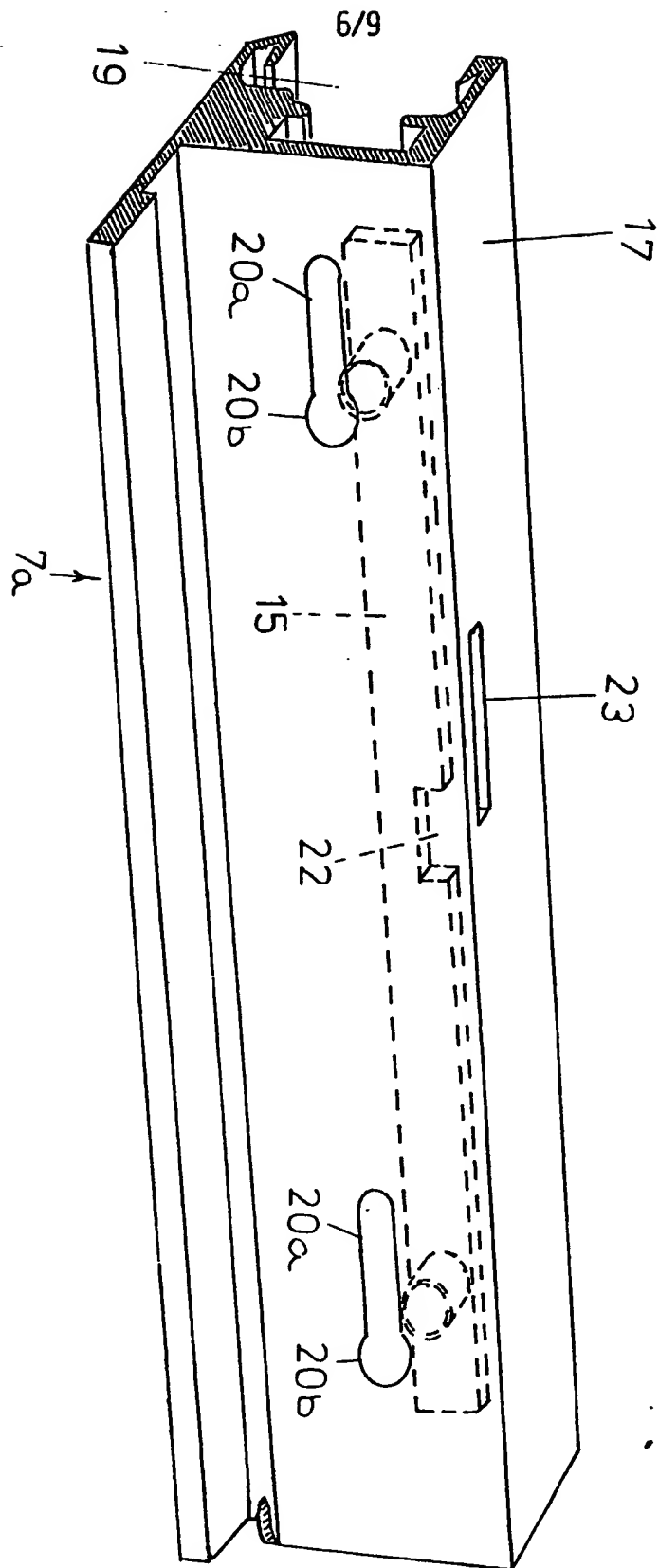


FIG. 6.

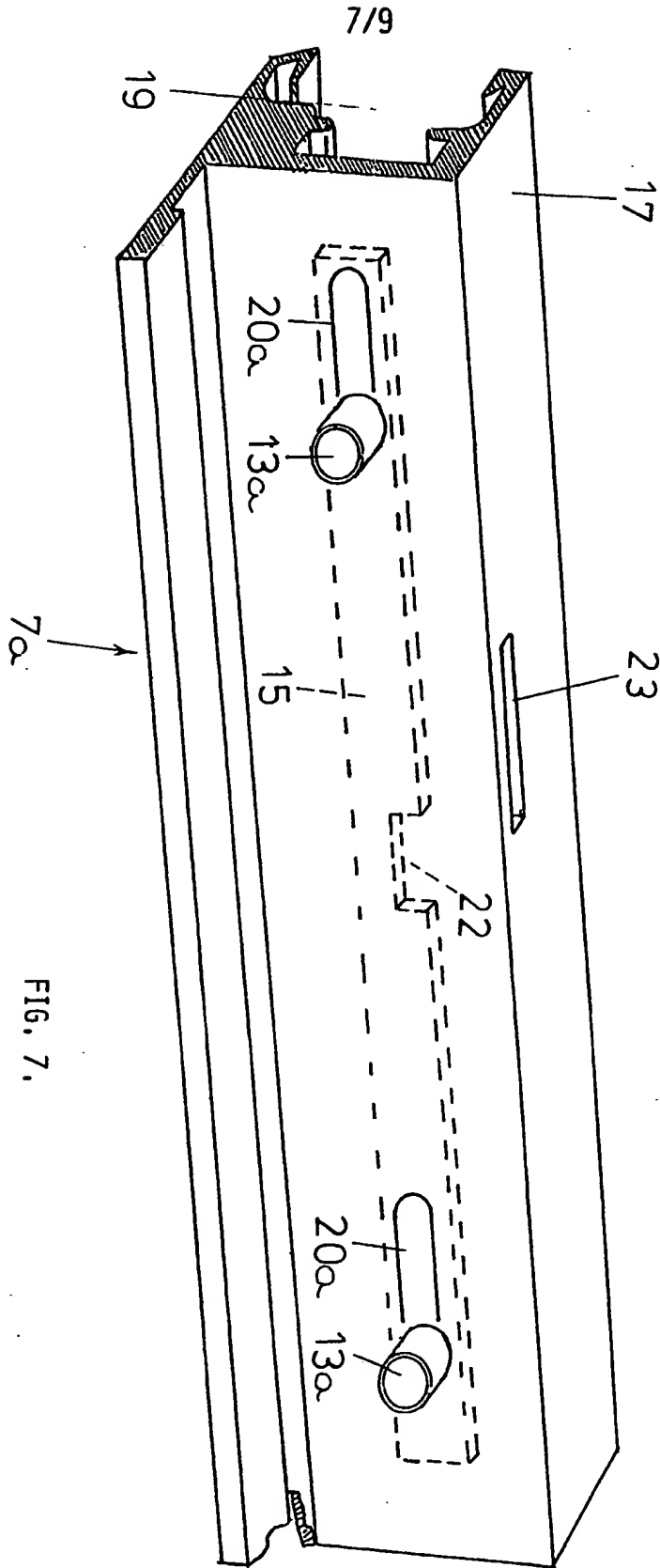
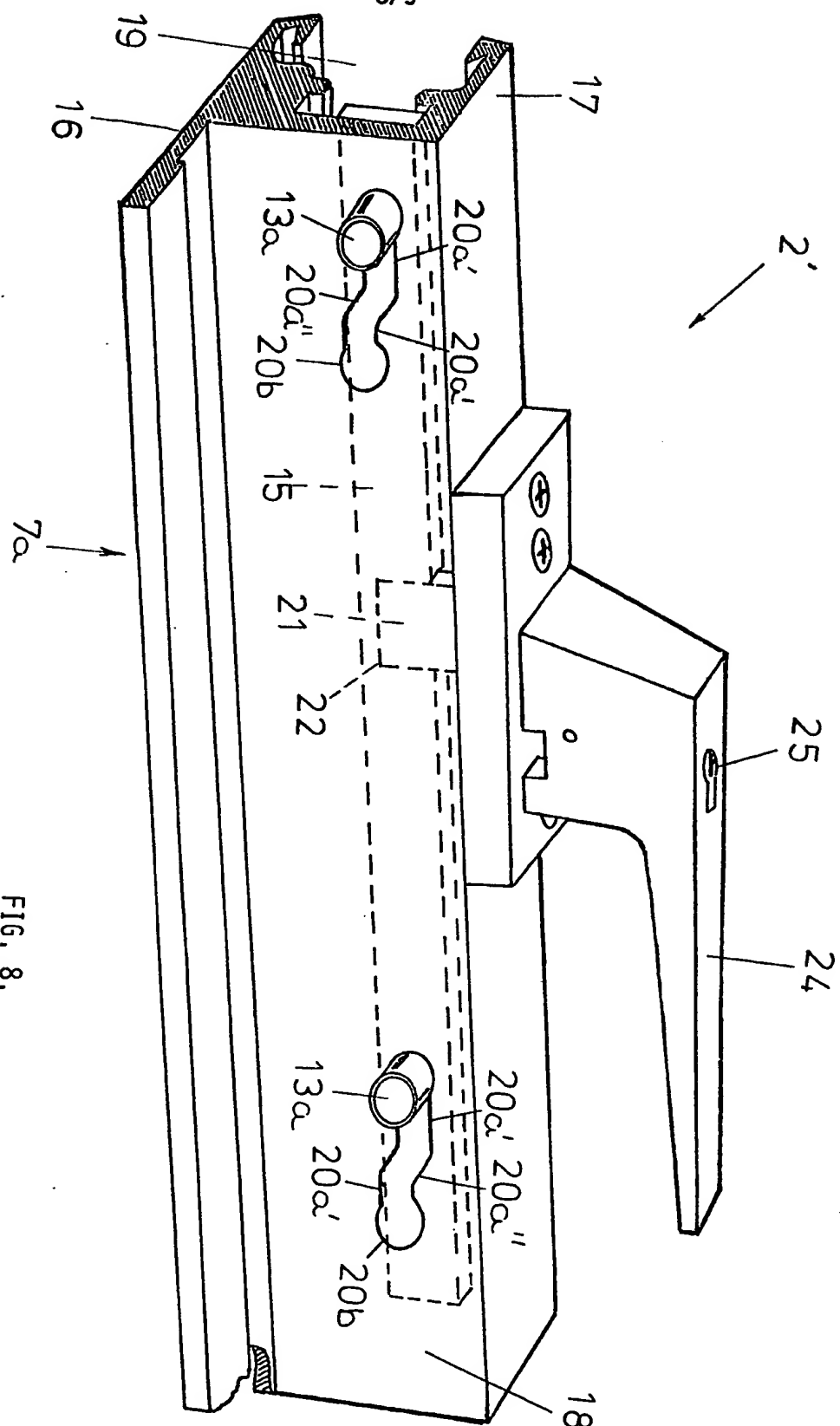


FIG. 7.



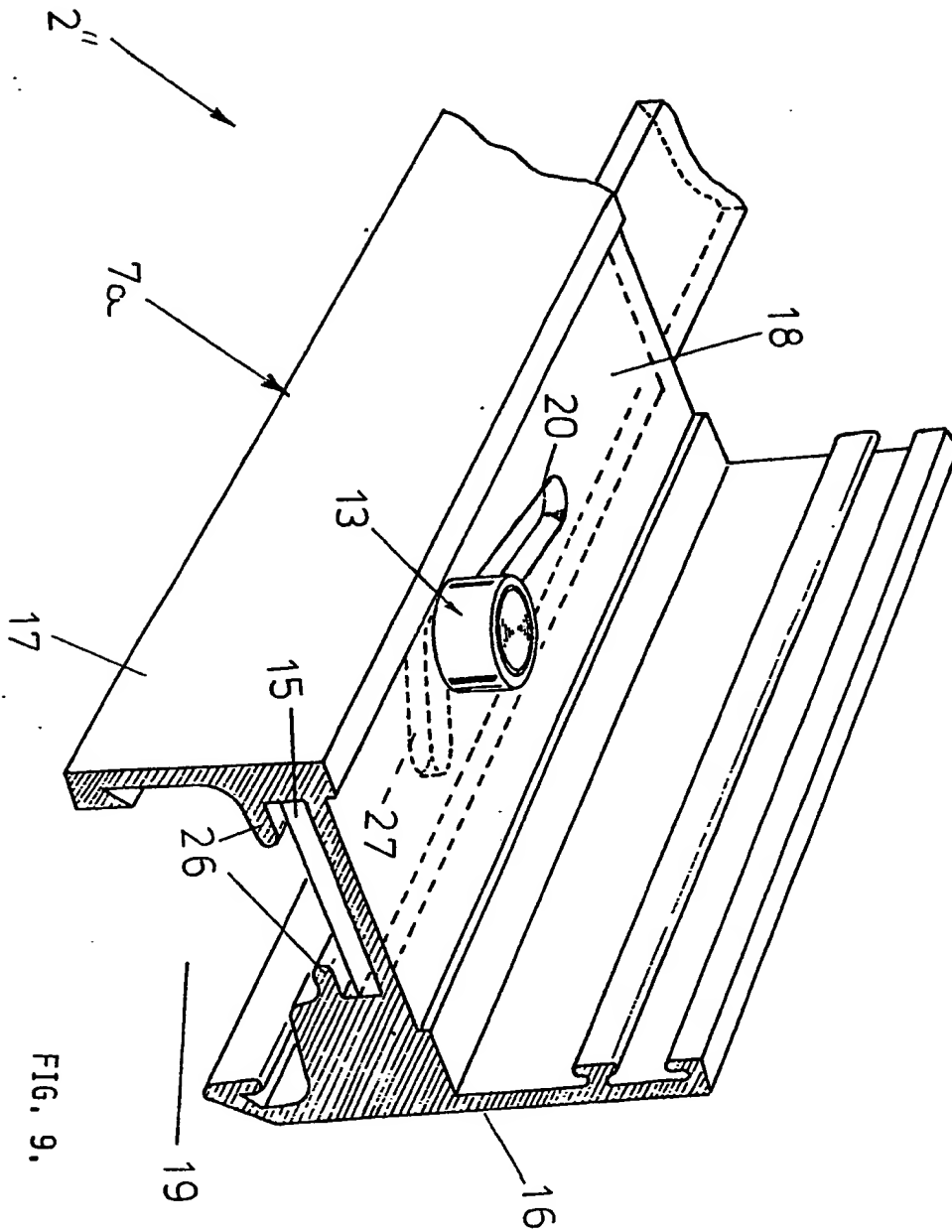


FIG. 9.

SPECIFICATION

Fasteners

- 5 This invention relates to fasteners such as are used to releasably secure together two relatively movable members, for example a door or sash mounted for hinged, pivotal or sliding movement relative to a fixed frame. More particularly, the invention is concerned with fasteners of the type herein specified as comprising a rail assembly slidably mounted on one of the members which is provided with a plurality of spaced apart bolts, each bolt being arranged to engage a corresponding one of a plurality of keepers on the other member to secure the members together, and an actuator coupled to the rail assembly which is operable to displace the bolts simultaneously.
- 10 Fasteners of the type specified are known as espagnolette bolts and the multi-point fastening provides greater security than a single point fastening. However, in the known espagnolette bolts, the rail assembly is positioned on the outer face of a vertical or horizontal frame element and is secured by a cover plate provided with a plurality of elongate openings through which the bolts project for engagement with the keepers.
- 15 A disadvantage of such arrangement is that either a larger rebate must be provided to increase the clearance space between the members to accommodate the rail assembly and cover plate or a groove must be formed in the outer face of the frame element to allow flush mounting of the rail assembly and cover plate.
- 20 Increasing the clearance space is detrimental to the close-fit necessary to provide a good seal between the members whilst forming a groove in the outer face of the frame element increases manufacturing costs. Additionally, it is not possible to increase the clearance space or provide a groove in the outer face of the frame element in existing installations where the members are constructed from extrusions of aluminium alloy and/or plastics material.
- 25 In certain applications a weather seal of some kind may be provided on one of the members and it is desirable for the fastener to provide a pull-in action on bringing the members together to ensure that the necessary close-fit for sealing is obtained and whilst also providing a break-seal action on moving the members apart to overcome the frictional resistance of the seal to separation of the members.
- 30 In the known espagnolette fasteners, ramp surfaces have been provided on one or both of the bolts and associated keepers to provide the pull-in and break-seal actions on displacing the bolts within the keepers.
- 35 A disadvantage of this arrangement, however, is that it requires extremely accurate mounting of the keepers to ensure all the

ramp surfaces engage simultaneously and provide the same leverage, otherwise uneven loads can be applied giving rise to localised stresses which is undesirable.

- 70 The installation of the known espagnolette bolts, especially those incorporating a pull-in and break-seal action, is therefore a difficult and time consuming operation requiring a high degree of skill.
- 75 It is an object of the present invention to provide a fastener of the type specified which overcomes some or all of the disadvantages of the known espagnolette bolts above-described.
- 80 According to a first aspect of the present invention there is provided in a frame consisting of two relatively movable members, a fastener comprising a rail assembly slidably mounted on an inner face of a frame element of one of the members which is provided with a plurality of spaced apart bolts extending transversely to the direction of sliding movement of the rail assembly, each bolt projecting outwards through a respective elongate opening formed in the frame element and being arranged to engage a corresponding one of a plurality of keepers on the other member to secure the members together, and an actuator coupled to the rail assembly and operable to displace the bolts simultaneously.
- 85 By the first aspect of the present invention in which the rail assembly is mounted on an inner face of a frame element of the member, the problems of reduced clearance space or the provision of a special mounting groove previously encountered when mounting the rail assembly on an outer face of a frame element of the member are avoided. Additionally, the need for a cover plate formed with openings for the bolts as required with the external mounting of the rail assembly is avoided by forming the openings in the frame element itself. Thus the number of components is reduced and simplified assembly is facilitated.
- 90 According to a second aspect of the present invention there is provided in a frame consisting of two relatively movable members, a fastener comprising a rail assembly slidably mounted on a frame element of one of the members and provided with a plurality of spaced apart bolts extending transversely to the direction of sliding movement of the rail assembly, each bolt projecting outwards through a respective elongate opening formed in an overlying structure associated with the rail assembly and being arranged to engage a corresponding one of a plurality of keepers on the other member to secure the members together, and an actuator coupled to the rail assembly and operable to displace the bolts simultaneously wherein the openings in the overlying structure are constructed and arranged to co-operate with the bolts so that, on actuation of the rail assembly to displace the bolts longitudinally, the bolts are simulta-

neously displaced laterally to provide a pull-in action or break-seal action.

By the second aspect of the present invention in which a pull-in action or break-seal action is provided by co-operation of the bolts with a structure associated with the rail assembly, the problems of alignment between ramp surfaces on the bolts on one member and/or the keepers mounted on the other member are avoided and assembly is further facilitated.

The overlying structure may comprise a cover plate when the rail assembly is mounted on an outer face of the frame element, i.e. as in the known espagnolette fasteners. Alternatively, the overlying structure may comprise the frame element itself when the rail assembly is mounted on an inner face of the frame element, i.e. as in the first aspect of the present invention.

Other features, advantages and benefits of both aspects of the present invention will be apparent from the following description of three exemplary embodiments of fasteners shown in the accompanying drawings in which:-

Figure 1 is a perspective view of a window incorporating a fastener according to the present invention;

Figure 2 is a perspective view, partly broken away for clarity, showing the detail of the engagement between one of the bolts of the fastener and a keeper;

Figure 3 is a perspective view showing the detail of the installation of the fastener with the bolts in a first extreme position;

Figure 4 is a perspective view similar to *Fig. 3* but with the bolts in a second extreme position;

Figure 5 is an exploded perspective view of the rail assembly;

Figures 6 and 7 are perspective views showing the method of fitment of the rail assembly;

Figure 8 is a perspective view of a second embodiment of fastener showing the detail of the installation of the rail assembly with the bolts in the second extreme position; and

Figure 9 is a perspective view of part of a third embodiment of fastener showing the detail of the installation of the rail assembly with the bolts in the second extreme position.

Referring first to *Figs. 1 and 2*, a window incorporating a fastener 2 in accordance with the present invention comprises a fixed frame 3 in which a glazed sash 4 is pivotally mounted by means of a pair of friction stays 5 provided one at each side of the sash 4. The stays 5 control opening/closing movement of the sash 4 and, in known manner, the internal friction of one or more friction pivot joints 6 of each stay 5 retains the sash 4 in any selected open position. Such stays 5 are well known and further description of their construction and operation is not necessary to

the understanding of the present invention.

The sash 4 and fixed frame 3 are each constructed from four elongate frame elements 7 and 8 respectively formed from extrusions of aluminium alloy of appropriate section cut to length, mitred at the ends and joined by corner cleats (not shown) received within the section of adjacent ends. The frame elements 7,8 could also be extrusions of plastics material or an aluminium alloy/plastics material composite.

The fixed frame 3 is mounted within the rebate of a timber frame 9 and the lower horizontal frame element 8a mounts two spaced apart keepers 10. Each keeper 10 comprises a rectangular body 11 formed with a slot 12 extending parallel to the length of the frame element 8a and open at one end to receive a respective bolt 13 of the fastener 2 mounted on the lower horizontal frame element 7a of the sash 4 to secure the sash 4 in a closed position as will now be further described with reference to *Figs. 3 to 7*.

The fastener 2 includes a rail assembly 14 comprising an elongate flat plate 15 on which two bolts 13 are mounted at spaced apart positions corresponding to the spacing of the keepers 10 mounted on the fixed frame 3. Each bolt 13 is fixed and has a cylindrical head 13a with a rotatable outer ring 13b and a neck 13c of reduced cross-section.

The lower frame element 7a of the sash 4 has two spaced apart longitudinally extending parallel flanges 16,17 connected by a longitudinally extending transverse web 18. The flanges 16,17 define planar front and rear surfaces respectively of the sash and together with the web 18 define a channel-section recess 19 open to the inside of the sash 4 in which the marginal edge of glazing is received.

The web 18 is formed with two spaced apart openings 20 of key-hole shape each comprising an elongate narrow portion 20a extending parallel to the length of the frame element 7a and an enlarged end portion 20b. The rail plate 15 is slidably mounted on the inner face 18a of the web 18 within the recess 19 and each bolt 13 extends transversely to the direction of sliding movement of the rail plate 15 and projects outwards through a corresponding one of the openings 20.

A drive peg 21 freely received in a cut-out 22 in the rail plate 15 extends outwards through a longitudinal slot 23 in the flange 17 and is coupled to a rotatable handle 24 by a mechanism which converts rotary motion of the handle 24 into linear movement of the drive peg 21 to slide the rail plate longitudinally within the recess 19.

The handle 24 is rotatable through 90° to move the rail plate 15 and displace the bolts 13 simultaneously between a first extreme position shown in *Fig. 3* in which the drive peg 21 engages the end of the slot 23 and a

second extreme position shown in Fig. 4 in which each bolt neck 13c engages the end of the narrow portion 20a of the associated opening. A key-operated lock 25 mounted in the boss 24a of the handle enables the handle to be locked against rotation with the bolts 13 in the second extreme position.

Assembly of the fastener is as follows, first the rail plate 15 is inserted into the recess 19 and each bolt head 13a passed through the enlarged end portion 20b of the associated opening. The rail plate 15 is then slid lengthwise to locate each bolt neck 13c in the narrow portion 20a of the associated opening and align the cut-out 22 in the rail plate with the slot 23 in the flange. The drive peg 21 is next inserted through the slot 23 to engage the cut-out 22 and the handle 24 secured to the flange. Once assembled, the bolts 13 are retained within the narrow portion 20a of the associated opening by the presence of the drive peg 21 in the cut-out 22 and cannot return to the enlarged end portion 20b thereby ensuring the location of the rail plate 15 on the inner face 18a of the web. In this way, by using the bolts 13 to mount the rail plate 15, no special formations are required within the recess 19 to locate and retain the rail plate 15 and the rail plate 15 can be made sufficiently narrow to allow push fitting. As a result, fitment of the rail plate is considerably simplified and assembly of the fastener to frame elements having recesses of different width and profile is facilitated.

In operation, starting from the open position of the sash 4 shown in Fig. 1, the bolts 13 are in the first extreme position shown in Fig. 3 and, on closing the sash 4, each bolt 13 is positioned adjacent to the open end of the slot 12 in the corresponding keeper 10. The handle 24 is then rotated through 90° causing the drive peg 21 to move the rail plate 15 and simultaneously displace the bolts 13, guided in the narrow portion 20a of the associated opening, to the second extreme position shown in Fig. 4 so that each bolt 13 is wholly within the slot 12 in the corresponding keeper 10 and opening movement of the sash 4 is prevented. The bolts 13 can be locked in the second extreme position to prevent unauthorised release of the fastener 2 by operation of the lock 25 on the handle 24 to secure the handle 24 against rotation. The fastener 2 may be released to allow opening movement of the sash 4 by a reverse of the above-described operation.

In the embodiment thus described, the narrow portion 20a of each opening in the web 18 of the frame element 7a extends parallel to the length of the frame element 7a and parallel to the slot 12 in each keeper 10. As a result, the bolts 13 are displaced longitudinally between the first and second extreme positions and the fastening mechanism does not provide a pull-in action on closing the sash 4

or a break-seal action on opening the sash 4.

Referring now to the second embodiment of fastener 2' shown in Fig. 8, there is shown a modification to the fastener 2 shown in Figs. 3 to 7 and like reference numerals are used to indicate corresponding parts.

The fastener 2' is essentially similar to that above-described with reference to Figs. 3 to 7 apart from the openings 20 in the web 18 of the frame element 7a which are shaped to co-operate with the bolts 13 to provide a pull-in action on closing the sash 4 and a break-seal action on opening the sash 4 in addition to the normal fastening action above-described.

More particularly, each opening 20 in the web 18 is again of key-hole shape having the enlarged end portion 20b to allow passage of the bolt head 13a of the corresponding bolt 13 on mounting the rail plate 15 but, the elongate narrow portion 20a is in three parts, comprising end parts 20a' extending parallel to the length of the frame element 7a and connected by a centre part 20a'' inclined to the length of the frame element 7a. As a result, on moving the rail plate 15, the bolts 13, guided in the narrow portion 20a of the associated opening, are simultaneously displaced longitudinally and laterally between the first and second extreme positions. Consequently, when each bolt 13 is received within the slot 12 in the corresponding keeper 10, the lateral displacement of the bolts urges the sash 4 either towards the fixed frame 3 (pull-in) or away from the fixed frame 3 (break-seal) depending on the direction of rotation of the handle 24. During such operation, the rail plate 15 is also displaced longitudinally and laterally within the recess 19 and this is allowed by the rail plate being narrower than the base of the recess 19 as shown and the end of the drive peg 21 being freely received in the cut-out 22. In all other respects operation of the fastener 2' is similar to that above-described with reference to the first embodiment.

Referring now to Fig. 9, a third embodiment of fastener 2'' is shown which also provides pull-in and break-seal actions in addition to the normal fastening action, but in a manner different to that above-described with reference to Fig. 8. Where appropriate like reference numerals are used to indicate components corresponding to those of the first and second embodiments.

As shown, the rail plate 15 has a width corresponding to the base of the recess 19 and is slidably retained in the recess by a pair of opposed inwardly directed longitudinal lips 26. The web 18 again has two longitudinally spaced apart openings 20 (one only shown) but, instead of the key-hole shape above-described, the openings 20 are of uniform width and are inclined to the length of the frame element 7a. The rail plate 15 has two similar spaced apart openings 27 (one only shown)

formed therein but inclined in the opposite direction to the openings 20. Each bolt 13 is slidably mounted in a respective one of the rail plate openings 27 and projects outwards through a corresponding one of the frame element openings 20. The opposite inclination of each pair of openings 20, 27 produces a camming action on the associated bolt 13 on moving the rail plate 15 relative to the frame element 7a and the bolts are simultaneously displaced longitudinally and laterally between the first and second extreme positions. In all other respects the fastener 2" is of similar construction to the first and second embodiments and operation is similar to that of the second embodiment i.e. simultaneous longitudinal and lateral displacement of the bolts 13 within the slot 12 of the associated keeper 10 urges the sash 4 either towards (pull-in) or away from (break-seal) the fixed frame 3 depending on the direction of rotation of the handle.

It will be understood that the embodiments above-described may be modified in a number of ways without departing from the two main inventive concepts expressed herein. For example, the rail plate 15 may be mounted on a frame element of the fixed frame 3 and the keepers 10 mounted on the sash 4 whilst the number of bolts 13 and corresponding keepers may be increased to provide any number of fastening points as may be desired for a given size of window. Furthermore, the rail assembly and keepers may be mounted on horizontal frame elements as described or vertical frame elements. Additionally, the keepers may be separate components attached to the frame element as described or they may be formed integrally in the frame element.

With regard to the first and second embodiments in which the bolt openings 20 in the frame element 7a are of key-hole shape to facilitate assembly by allowing the bolt heads 13a to pass through the openings on location of the rail plate in the recess 19, this is not essential and the bolts 13 could be attached to the rail plate after location of the rail plate in the recess by insertion through the openings 20 from the outside and in such cases the openings could comprise the narrow portions 20a only.

With regard to the second and third embodiments the rail plate 15 may be mounted within the recess 19 in the frame element 7a as described or the rail plate 15 may be mounted on the outer face of the frame element 7a with an overlying cover plate formed with openings corresponding to those formed in the web 18 of the frame element 7a to co-operate with the bolts 13 to provide the pull-in and break-seal actions. Where the rail plate is on the outer face, it may be surface mounted or a groove may be formed in the outer face to provide flush mounting.

Finally although the invention has been de-

scribed with reference to a sash mounted for pivotal movement relative to a fixed frame it will be appreciated that the sash could be mounted for hinged or sliding movement and furthermore that the invention has application to any two members mounted for relative hinged, pivotal or sliding movement and specifically includes both windows and doors.

75 CLAIMS

1. In a frame consisting of two relatively movable members, a fastener comprising a rail assembly slidably mounted on an inner face of an elongate frame element of one of the members, the rail assembly having a plurality of spaced apart bolts extending transversely to the direction of sliding movement of the rail assembly with each bolt projecting outwards through a respective elongate opening formed in the frame element and being arranged to engage a corresponding one of a plurality of keepers on the other member to secure the members together and, an actuator coupled to the rail assembly and operable to displace the bolts simultaneously.

2. In a frame according to claim 1 wherein the rail assembly comprises an elongate flat plate and the frame element of said one member has two spaced apart longitudinally extending flanges connected by a transverse longitudinally extending web to define a channel-section recess in which the plate is received.

3. In a frame according to claim 2 wherein the elongate openings are formed in the web and the plate is mounted on the inner face of the web.

4. In a frame according to claim 3 wherein each bolt is rigidly mounted on the plate and comprises a head and a neck, the neck being received in and slidable lengthwise of the associated opening with the head being disposed on the outer face of the web for engagement with the corresponding keeper.

5. In a frame according to claim 4 wherein the head of each bolt is of increased cross-section relative to the neck such that, in the assembled condition, the plate is retained against the inner face of the web by the bolt heads.

6. In a frame according to claim 5 wherein each opening is of key-hole shape having a narrow elongate portion through which the bolt neck but not the bolt head may pass and an enlarged end portion through which the bolt head may pass for assembly purposes and, in the assembled condition, the bolt is constrained to sliding movement within the narrow portion.

7. In a frame according to any one of claims 3 to 6 wherein the plate is of narrower width than the base of the recess defined by the inner face of the web.

8. In a frame according to any of the preceding claims wherein each opening extends

parallel to the length of the frame element.

9. In a frame according to any of claim 1 to 7 wherein each opening is inclined relative to the length of the frame element over at least a part of the length of the opening.

10. In a frame according to any one of claims 1 to 3 wherein the plate has a plurality of elongate openings each aligned with a respective one of the openings in the frame element and, each bolt is slidably mounted on the plate and comprises a head and a neck, the neck being received in and slidable lengthwise of the associated aligned openings and the head being disposed on the outer face of the web for engagement with the corresponding keeper.

11. In a frame according to claim 10 wherein each opening is inclined relative to the length of the associated frame element/plate and aligned openings are oppositely inclined.

12. In a frame according to any one of the preceding claims wherein the actuator comprises a manually operable rotatable handle operatively connected to a drive peg located in a cut-out in the plate.

13. In a frame according to claim 12 wherein the handle incorporates a key-operated lock.

14. In a frame according to any one of the preceding claims wherein each keeper comprises a body having a slot open at one end to receive the associated bolt.

15. In a frame according to any one of the preceding claims wherein the two relatively movable members comprise a fixed frame and a sash frame.

16. In a frame according to claim 15 wherein the rail assembly is mounted on the sash frame and the keepers are mounted on the fixed frame.

17. In a frame according to claim 15 or claim 16 wherein the sash frame is mounted for pivotal, hinged or sliding movement relative to the fixed frame.

18. In a frame consisting of two relatively movable members, a fastener substantially as hereinbefore described with reference to Figs. 1 to 7 of the accompanying drawings.

19. In a frame consisting of two relatively movable members, a fastener substantially as hereinbefore described with reference to Figs. 1 to 7 of the accompanying drawings as modified by Fig. 8 or Fig. 9 of the accompanying drawings.

20. In a frame consisting of two relatively movable members, a fastener comprising a rail assembly slidably mounted on an elongate frame element of one of the members, the rail assembly having a plurality of spaced apart bolts extending transversely to the direction of sliding movement of the rail assembly with each bolt projecting outwards through a respective elongate opening formed in an overlying structure associated with the rail as-

sembly and being arranged to engage a corresponding one of a plurality of keepers on the other member to secure the members together, and an actuator coupled to the rail assembly and operable to displace the bolts simultaneously wherein the openings in the overlying structure are constructed and arranged to co-operate with the bolts so that, on actuation of the rail assembly to displace the bolts longitudinally, the bolts are simultaneously displaced laterally to provide a pull-in action or break-seal action.

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